

Appl. No. 09/297,289
Amendment filed July 1, 2004
Response to Office Action dated March 1, 2004

LISTING OF CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application.

1-13. (cancelled)

14. (Currently amended) A spring for ~~mounting~~driving a precision machine, which spring can be mounted on a substrate receiving at least a portion of the spring, said spring being formed of spirally arranged amorphous metal having an S-shaped free exploded shape lying in a plane and ~~shaped~~ so that when the spring is mounted on the substrate the spring has an initial flexure imparted thereto, and serving as an energy storage device.

15. (Previously presented) A spring as recited by claim 14, wherein said spring is supported by a substrate, said spring defining a flexure.

16. (Previously presented) A spring as recited by claim 14, wherein said spring has a circular cross-section.

17. (Previously presented) A spring as recited by claim 16, wherein the circular cross-section has a diameter of at least 0.05 mm.

18. (Previously presented) A spring as recited by claim 14, wherein said spring has a rectangular cross-section.

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19. (Previously presented) A spring as recited by claim 18, wherein the rectangular cross-section has a thickness of at least 0.01 mm and a width of at least 0.05 mm.

20. (Previously presented) A spring as recited by claim 14, wherein said spring is constructed from a non-magnetic material.

21. (Previously presented) A spring as recited by claim 14, further comprising a plurality of amorphous metal strips laminated together.

22. (Previously presented) A spring as recited by claim 21, wherein said plurality of amorphous metal strips are laminated together with a synthetic resin adhesive.

23. (Currently amended) A mainspring for ~~mounting~~driving a precision machine, which spring can be mounted on a substrate receiving at least a portion of the mainspring, said mainspring being formed of spirally arranged amorphous metal having an S-shaped free exploded shape lying in a plane ~~and shaped~~ so that when the mainspring is mounted on the substrate the mainspring has an initial flexure imparted thereto.

24. (Previously presented) A mainspring as recited by claim 23, wherein said mainspring is incorporated in a substrate, said spring defining a flexure.

25. (Previously presented) A mainspring as recited by claim 23, wherein said mainspring has a circular cross-section.

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26. (Previously presented) A mainspring as recited by claim 25, wherein the circular cross-section has a diameter of at least 0.05 mm.

27. (Previously presented) A mainspring as recited by claim 23, wherein said mainspring has a rectangular cross-section.

28. (Previously presented) A mainspring as recited by claim 27, wherein the rectangular cross-section has a thickness of at least 0.01 mm and a width of at least 0.05 mm.

29. (Previously presented) A mainspring as recited by claim 23, wherein said mainspring is constructed from a non-magnetic material.

30. (Previously presented) A mainspring as recited by claim 23, further comprising a plurality of amorphous metal strips laminated together.

31. (Previously presented) A mainspring as recited by claim 30, wherein said plurality of amorphous metal strips are laminated together with a synthetic resin adhesive.

32. (Previously presented) A mainspring as recited by claim 23, wherein said mainspring defines a free-exploded S-shape.

33. (Previously presented) A mainspring as recited by claim 31, wherein said mainspring includes an inner end which serves as a winding side for said mainspring, and an outer end, wherein said free-exploded S-shape has a curvature changing point where the

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curvature of the free-exploded shape changes, said curvature changing point being located at a point closer to said inner end than to a point midway between said inner end and said outer end.

34. (Currently amended) A hairspring for ~~mounting~~driving a precision machine, which spring can be mounted on a substrate receiving at least a portion of the hairspring, said hairspring being formed of spirally arranged amorphous metal having an S-shaped free exploded shape lying in a plane ~~and shaped~~ so that when the hair is mounted on the substrate the spring has an initial flexure imparted thereto.

35. (Previously presented) A hairspring as recited by claim 34, wherein said hairspring is supported by a substrate, said hairspring defining a flexure.

36. (Previously presented) A hairspring as recited by claim 34, wherein said hairspring has a circular cross-section.

37. (Previously presented) A hairspring as recited by claim 36, wherein the circular cross-section has a diameter of at least 0.05 mm.

38. (Previously presented) A hairspring as recited by claim 34, wherein said hairspring has a rectangular cross-section.

39. (Previously presented) A hairspring as recited by claim 38, wherein the rectangular cross-section has a thickness of at least 0.01 mm and a width of at least 0.05 mm.

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40. (Previously presented) A hairspring as recited by claim 34, wherein said hairspring is constructed from a non-magnetic material.

41-53. (Cancelled)

54. (Currently amended) A mainspring for ~~mounting~~driving a precision machine, which spring can be mounted on a substrate receiving at least a portion of the mainspring, the mainspring comprising a plurality of spirally arranged laminated amorphous metal sheets, together having an S-shaped free exploded shape lying in a plane ~~and shaped~~ so that when the mainspring is mounted on the substrate the mainspring has an initial flexure imparted thereto.

55. (Previously presented) A mainspring according to claim 54, further comprising an adhesive interposed between two said laminated amorphous metal sheets.

56. (Previously presented) An mainspring according to claim 54, further comprising an adhesive layer interposed directly between two adjacent said laminated amorphous metal sheets.

57. (Previously presented) A mainspring according to claim 54, wherein said mainspring is a spiral spring.

58-70. (Cancelled)

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71. (Previously presented) A spring as in claim 14, wherein said metal comprises Ni-Si-B, Ni-Si-Cr, Ni-B-Cr or Co-Fe-Cr amorphous metal.

72. (Previously presented) A mainspring as in claim 23, wherein said metal comprises Ni-Si-B, Ni-Si-Cr, Ni-B-Cr or Co-Fe-Cr amorphous metal.

73. (Previously presented) A hairspring as in claim 34, wherein said metal comprises Ni-Si-B, Ni-Si-Cr, Ni-B-Cr or Co-Fe-Cr amorphous metal.

74. (Previously presented) A mainspring as in claim 54, wherein at least one of said amorphous metal sheets comprises Ni-Si-B, Ni-Si-Cr, Ni-B-Cr or Co-Fe-Cr amorphous metal.

75. (Previously presented) A spring as in claim 14, wherein said metal has a σ_{\max} (kgf/mm²) of at least 340 and an E (kgf/mm²) in the range of 9,000-12,000.

76. (Previously presented) A mainspring as in claim 23, wherein said metal has a σ_{\max} (kgf/mm²) of at least 340 and an E (kgf/mm²) in the range of 9,000-12,000.

77. (Previously presented) A hairspring as in claim 34, wherein said metal has a σ_{\max} (kgf/mm²) of at least 340 and an E (kgf/mm²) in the range of 9,000-12,000.

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78. (Previously presented) A mainspring as in claim 54, wherein at least one of said metal sheets has a σ_{max} (kgf/mm²) of at least 340 and an E (kgf/mm²) in the range of 9,000-12,000.

79. (Previously presented) A spring as in claim 14, wherein said metal has a circular cross-sectional diameter of at least 0.05 mm, or a rectangular cross-sectional shape at least 0.01 mm thick and at least 0.05 mm wide.

80. (Previously presented) A mainspring as in claim 23, wherein said metal has a circular cross-sectional diameter of at least 0.05 mm, or a rectangular cross-sectional shape at least 0.01 mm thick and at least 0.05 mm wide.

81. (Previously presented) A hairspring as in claim 34, wherein said metal has a circular cross-sectional diameter of at least 0.05 mm, or a rectangular cross-sectional shape at least 0.01 mm thick and at least 0.05 mm wide.

82. (Previously presented) A mainspring as in claim 54, wherein said laminated amorphous metal sheets, together, have a circular cross-sectional diameter of at least 0.05 mm, or a rectangular cross-sectional shape at least 0.01 mm thick and at least 0.05 mm wide.

83. (Previously presented) A spring as in claim 14, wherein said spring is manufactured using any of a single roll process, a dual roll process or a rotation underwater spinning process.

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84. (Previously presented) A mainspring as in claim 23, wherein said mainspring is manufactured using any of a single roll process, a dual roll process or a rotation underwater spinning process.

85. (Previously presented) A hairspring as in claim 34, wherein said hairspring is manufactured using any of a single roll process, a dual roll process or a rotation underwater spinning process.

86. (Previously presented) A mainspring as in claim 54, wherein at least one said amorphous metal sheet is manufactured using at least one of a single roll process, a dual roll process or a rotation underwater spinning process.

87. (Previously presented) A spring as in claim 14, wherein said amorphous metal is non-magnetic.

88. (Previously presented) A mainspring as in claim 23, wherein said amorphous metal is non-magnetic .

89. (Previously presented) A hairspring as in claim 34, wherein said amorphous metal is non-magnetic .

90. (Previously presented) A mainspring as in claim 54, wherein at least one said amorphous metal sheet is non-magnetic.

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91. (Previously presented) A spring as in claim 14, wherein said spring is manufactured by integrally laminating at least two amorphous metal sheets.

92. (Previously presented) A mainspring as in claim 23, wherein said mainspring is manufactured by integrally laminating at least two amorphous metal sheets.

93. (Previously presented) A hairspring as in claim 34, wherein said hairspring is manufactured by integrally laminating at least two amorphous metal sheets.

94. (Previously presented) A mainspring having a drive mechanism as in claim 54, wherein said mainspring is manufactured by integrally laminating at least two amorphous metal sheets.